

# **The Baltic Surge. Navigating offshore wind expansion in Poland**

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# Key figures and conclusions

## 18 GW

The projected installed capacity for wind power in the Polish part of the Baltic Sea by 2040.

## 2025

The year of the first offshore auction in Phase II of the support scheme.

## 118 EUR/MWh

The revised proposed maximum price for electricity from offshore wind farms that producers can bid in the auction.

- There is currently no operational offshore wind farm in Poland. The building of the first offshore installation is set to begin in early 2025.
- Preparations for launching of the Polish offshore wind farms in the Baltic Sea are steadily progressing, but achieving the ambitious goals set out in government strategies is not yet guaranteed.
- Effective incentives and legal solutions should be implemented to support local industry and Polish service providers. The sectoral agreement and supply chain plans of materials and services are insufficient in this regard.
- The success of the upcoming 2025 Phase II projects auction largely depends on its structure and rules. The regulations governing the auction process should be made more flexible to avoid a concentration of auction volume in 2027.
- 31-33 GW is the estimated total offshore wind power potential in the Polish part of the Baltic Sea. Unlocking such capacity would require an update of the *Maritime Spatial Plan for Polish Sea Areas*.
- The industrial Special Energy Zones in northern Poland is a concept that could facilitate the integration of the offshore wind farm output with the national energy system.
- Given Poland's growing offshore capacity targets, development of the offshore cross-border and hybrid connections should be considered. Prospective directions for integrating energy transmission from offshore wind farms include Denmark and Sweden.

# 1. Introduction

**Poland's offshore wind energy (OWE) development ambitions are 6 and 18 GW for 2030 and 2040, respectively.** This fits in with the European Union's strategy to achieve up to 317 GW in offshore wind by mid-century (European Commission, 2023). Although the dominant role in achieving this goal will certainly be played by the North and Baltic Sea states, countries in the south of the continent are also planning to exploit Adriatic and Black Sea wind potential.

**Instrat is participating in the project entitled 'BLUECEE - Strengthening Policy and Governance Capacity for Blue Energy in Central and Eastern Europe'.** It aims to exchange good practices between stakeholders and strengthen readiness to deploy new generation capacity in the region's seas. The project is a collaboration with consortia from Bulgaria (Center for the Study of Democracy), Romania (Energy Policy Group) and Croatia (Faculty of Mechanical Engineering and Naval Architecture, University of Zagreb).

**We held workshops and webinars addressing CEE countries' most important challenges of offshore wind farm (OWF) construction.** The Polish edition of the workshop (Instrat, 2024) dealt with the issue of developing supporting infrastructure - transmission grids, power output facilities, logistics and production base. The meeting provided an opportunity for a fruitful discussion among cross-sectoral industry experts from Poland and Europe, during which selected issues were raised as potential barriers to the implementation of offshore wind energy, with particular emphasis on our part of the Baltic Sea. Optimistic voices, interesting ideas and opportunities facing the Polish offshore wind sector were also present. Conclusions from the meetings, which were also held in the project partners' countries, are included in our joint publication *At the Frontier - Guidelines for Unlocking the Offshore Wind Energy Potential in Central and Eastern Europe* (CSD, 2024).

**The following publication has two main objectives.** Firstly, it develops and updates the information contained in our *Winds of Change* (CSD, 2023) report published in November 2023, in which we, together with our project partners, outlined the conditions for offshore wind development in emerging markets of Poland, Bulgaria, Romania and Croatia. Secondly, it outlines the challenges that need to be addressed for Poland's offshore wind programme to succeed. We focus on four main areas that were addressed and discussed during the BLUECEE project: regulatory framework, maritime spatial planning, environmental coexistence and development of supporting infrastructure.

## 2. Regulatory and strategic framework

In this chapter, we describe the place of offshore wind in national energy transition plans, as well as the key considerations for project development and the supply chain.

**The offshore wind energy development is included as a strategic project in existing documents, including Energy Policy of Poland until 2040 (EPP2040) from 2021.** Its implementation, alongside nuclear power plants and the increased role of distributed energy, represents a fundamental element in striving to achieve a zero-emission power system. The position of offshore wind energy in Poland's strategy is supported by a wide range of experts, political parties, business stakeholders, non-governmental organisations, and local governments. According to the scenario presented in EPP2040, offshore wind

energy is also expected to significantly contribute to the country's economic growth, providing a development boost to regions that will serve as production, service, and staffing hubs for these investments, offering over 60,000 jobs by 2040. Although offshore wind was highlighted in previous strategies and the first permits for the construction and use of artificial islands were granted as early as 2012-2013, efforts to implement these investments accelerated after the Polish Offshore Wind Act came into force in 2021.

**However, the 2022 report by the Supreme Audit Office showed numerous instances of negligence related to the implementation of the OWE expansion.** The report showed, inter alia, the lack of a coherent and coordinated policy aimed at accelerating investment, the failure to take steps to simplify administrative procedures and the delay in the construction of the installation terminal.

**The new target of 18 GW by 2040 is yet to be incorporated into national strategic documents.** The current version of the EPP2040 came into force in March 2021, but its provisions have since become outdated, also in the context of offshore wind energy. Last year's amendment to the Offshore Wind Act raised the ambition from 11 GW to 18 GW, increasing auction volumes for which developers can compete in Phase II of offshore wind development. In 2024, updates are underway for various strategic documents, particularly the National Energy and Climate Plan. A draft document submitted for public consultation in September 2024 presents two scenarios: the current policies scenario and a more ambitious one that includes additional support for the transition. Both scenarios assume achieving 5.9 GW of offshore capacity by 2030 and 18 GW by 2040 (in WAM scenario), which is in line with the current Act. Updating the NECP is expected to be completed by late 2024 or early 2025. According to announcements, efforts to update EPP2040 will begin after that.

**The overly lengthy permitting process is a significant regulatory problem.** The preparatory procedure involves numerous administrative bodies and requires the fulfilment of many requirements, making it exceptionally, by European standards, time-consuming and bureaucratic. Entrepreneurs have to obtain a significant amount of permits and approvals that often overlap, which can cause delays. Investors have to deal with legal ambiguities and discrepancies in interpretation, which further increases investment risks. The fragmentation of the competencies of state institutions dealing with energy, such as the recent establishment of the Ministry of Industry, does not help in this context. Instead, a solution would be to follow proven practice from the North Sea markets. This should be started by establishing an entity (a so-called one-stop-shop) that will be the local partner responsible for coordinating and issuing all necessary project-related licences and permits. In Denmark, such an institution is the Danish Energy Agency; in Scotland, Marine Scotland, and in Germany, such a function is performed by the Federal Agency for Shipping and Hydrography (BSH).

**One of the biggest challenges currently faced by the Polish offshore wind market is the upcoming auction for 4 GW, which must take place by the end of 2025.** The auction for offshore wind farms from Phase II of offshore wind development is a competitive process in which investors can secure the right to cover the negative balance (bilateral contract for difference). The legal requirement for a successful auction is the submission of three projects. Two of them - Baltica 1 (PGE) and Battyk 1 (Polenergia/Equinor) - are in an advanced state of preparation. The third will likely be one of Orlen's investments (Baltic East). However, the management of Orlen Neptun has indicated that they may not be able to obtain the environmental decision in time, which is necessary for the project to participate in the auction. The industry emphasises that tight schedules are a result of the Ministry of Infrastructure's late allocation of site concessions for Phase II. If next year's

auction is unsuccessful, the volume will be shifted to the 2027 auction, amounting to a total of 8 GW, in accordance with the provisions of the Offshore Act.

**Such accumulation of projects competing in the 2027 auction would be extremely detrimental to the success of offshore wind development.** An interruption in project delivery could divert the attention of the wind industry in favour of other markets, and the accumulation of such high demand for components and services in one short period would result in delays and price increases due to a compressed supply chain. From the state's perspective, the result would be a widening generation gap (both because of the delay in commissioning new capacity in offshore wind but also because of the risk of projects being abandoned) and a higher price for end-users of energy.

**The wind industry community is therefore right to call for more flexible auction rules<sup>1</sup>.** These include the possibility of postponing the auction to 2026 in the event of its failure in 2025, the use of unsupported remaining capacity of phase I projects or the division of projects into smaller parts with separate power output. The shape of the auction will be more broadly defined by its rules and regulations, which, according to the Offshore Act, are to be published by the Energy Regulatory Office six months prior to the auction start date.

**The draft regulation on the maximum strike price for offshore wind farms participating in Phase II auction has sparked some controversies.** In August 2024, the website of the Governmental Legislation Centre published a draft regulation by the Minister of Climate and Environment regarding the maximum price for electricity generated by offshore wind farms and fed into the grid that can be indicated in bids submitted in the auction by producers. The proposed price was set at 471.83 PLN/MWh (approx. 108 EUR/MWh), with an adjustment for inflation based on the index published by the Statistics Poland. The wind energy industry submitted many comments on the draft, most of which were well-founded. The majority of the concerns were related to inadequate technical assumptions and outdated cost and market forecasts. For example, the justification for the regulation referred to NREL's 2023 Annual Technology Baseline analysis instead of the recently published 2024 version, which indicates significantly higher CAPEX costs. According to the industry, the estimation of cable route lengths was incorrect, as it considered only the straight-line distance from the furthest projects to the shore, additionally omitting the length of the onshore cables. Furthermore, the capacity factor was deemed overestimated, with the draft assuming a rate of 45.7%. In their comments, the industry suggested lowering the capacity factor by a few percentage points (depending on the developer).

**After considering some comments submitted during interdepartmental consultations, reviews, and public consultations, the maximum price was raised to 512.32 PLN/MWh (approx. 118 EUR/MWh).**

**Determining the appropriate contract rates is a major challenge not only in Poland.** Contracts for difference should provide stable financial prospects enabling the implementation of investments, but they should not be excessively generous subsidies that burden end consumers and the state budget for decades. On the one hand, a contract price that is too low could lead to the failure or slowdown of offshore wind expansion, as seen in Western markets. The lack of a flexible approach to renegotiating support often resulted in project suspensions, a lack of bidders in auctions, or developers withdrawing

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<sup>1</sup> Legislative improvement proposals were presented by the Polish Wind Energy Association at a meeting of the Senate Committee on Climate and Environment on July 3, 2024. <https://www.senat.gov.pl/prace/komisje-senackie/posiedzenia,226,1,komisja-klimatu-i-srodowiska.html>

from a given market (Financial Times, 2024). At the same time, experiences from Phase I show that attractive support conditions for offshore wind have attracted large-scale investments and production facilities from supply chain leaders to Poland. Conversely, an overly generous support system can place a significant strain on public finances and result in high electricity prices for end consumers, both industrial and household. These are challenges that are currently being faced due to the continued intensive use of fossil fuels in Poland. It is renewable energy sources, including offshore wind, that are expected to alleviate these issues by contributing to a noticeable reduction in energy prices and budget expenditures on energy subsidies. However, the regulatory impact assessment of the maximum price regulation does not currently consider its impact on public finances, economic competitiveness, or the labour market, making it difficult to fully assess the socio-economic implications of this rate. However, experiences from auctions held in more advanced offshore wind markets show that the actual rate offered by winning bidders can be much lower than the maximum price. The key is to adjust it to the most cost-intensive projects in the Middle Bank area.

**Due to the key role of state-controlled energy companies, offshore wind development also requires addressing their ongoing issues, including the burden of coal assets.** The lack of a clear strategy for managing coal-fired power plants and mines, which weigh heavily on the finances of PGE, a company with the potential to install over 7 GW of offshore wind capacity, increases the company's costs, limits investment opportunities, may contribute to delays in offshore wind expansion, and could lead to more significant pressure for higher contract rates in future auctions.

**Preparations for offshore development were accompanied by promises regarding the scale of local content, but the actual involvement of Polish companies in the projects has been limited so far.** Offshore wind was seen as an opportunity for the Polish economy through the participation of local component manufacturers and service companies. Ambitions regarding local content and job creation are more broadly defined in the *Polish Offshore Wind Sector Deal* (Ministry of Climate and Environment, 2021). However, the experience of suppliers shows that investors are not always interested in using local services and products. There is an urgent need for effective incentives and solutions from the state to actively promote the participation of the Polish industry. The requirement to present supply chain plans<sup>2</sup> for materials and services to the Energy Regulatory Office has proven to be an ineffective tool - it does not translate into actual commitments during project execution. Although the final local content rate can only be determined after the full life cycle of an offshore wind farm, an analysis of publicly available information on contracted products and services shows that the involvement of Polish companies in Phase I has been relatively low.

**Poland needs to implement new EU regulations to accelerate and increase the benefits of building offshore wind farms.** The Wind Power Action Plan came into force in 2023, initiating a series of actions for European wind energy, such as speeding up the permitting process, increasing funding for new factory construction, combating unfair competition from outside the EU, and introducing a set of pre-qualification criteria for projects in future offshore auctions. A few months later in spring of 2024, as part of the European Green Deal Industrial Plan, the EU adopted the Net-Zero Industry Act, aiming to shorten administrative processes, introduce the category of strategic projects (net-zero strategic projects), and

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<sup>2</sup> The plans aimed to ensure the participation of Polish companies in offshore wind energy projects. The documents include detailed information on strategies for engaging local suppliers, the value chain structure, and collaboration with domestic subcontractors and local communities.



increase the production of zero-emission technologies within the EU. Other EU regulations supporting offshore renewable energy include the Emergency Regulation on permitting, the Technical Support Instrument, updates to the Renewable Energy Directive, the Critical Raw Materials Act, Trans-European Networks for Energy, and the reform of Electricity Market Design. Prompt implementation of the new regulations and recommendations into the national regulatory framework could standardise the Polish market for the global offshore wind business, accelerate the construction of offshore wind farms, and strengthen local industry while enhancing positive environmental impacts.

### 3. Environmental coexistence

**Each of the Phase I offshore wind farm projects has environmental decisions.** Decisions on the environmental conditions of a project are issued by the Regional Directors for Environmental Protection (RDEP) in order to limit the negative impact of the investment on nearby ecosystems. The issuance of the decision is preceded by the submission to RDEP of a report on the environmental impact of the project.

**Environmental decisions contain precise guidelines and obligations that investors must follow in order to minimise the impact on marine wildlife.** These stipulations include among other things, restrictions on the duration and manner of construction works, measures to protect marine animals and plants, and environmental monitoring requirements. Importantly, the restrictions vary depending on the location of the investment, which means that each offshore wind farm must be assessed individually, considering the specifics of the area, such as the presence of protected species or sensitive habitats.

**Introducing non-price criteria into the auction may be a way to mitigate the negative environmental impact of offshore wind farms.** These are additional qualitative parameters to encourage developers to compete not only by price but also to create additional benefits for biodiversity or the local economy. There are some solutions already introduced in European countries that can be singled out, e.g. noise reduction during the installation of foundations and the use of green steel in Germany or solutions to promote better integration of OWFs into the electricity system in the Netherlands. With the entry into force of the Net-Zero Industry Act, Member States will be obliged to introduce non-price criteria for at least 30% of the annual auction volume for renewable energy sources. However, in emerging offshore wind markets, the decision to introduce and select potential criteria should be preceded by thorough analysis and consultations, as they may lead to greater complexity in sector development.

**A helpful analytical tool for identifying susceptible natural areas is sensitivity mapping.** The process involves the collection of natural information such as the occurrence and conservation status of the species concerned, animal migration routes, survival rates, the risk of collision between birds and turbines or the risk of habitat displacement under the influence of the development of the wind farm and then estimating the sensitivity level of the spatial units (squares) considered. The sensitivity maps are not a substitute for a detailed environmental impact assessment, but they help to select preliminary areas for further analysis. It is a particularly useful tool in the context of the selection of accelerated RES development areas (go-to-areas), which are part of the RePowerEU strategy. The European Commission, in cooperation with BirdLife and Arcadis, has issued a sensitivity mapping guide (European Commission, 2020). This tool is now being used in Poland -

BirdLife, with its national partner, the Polish Society for the Protection of Birds (OTOP), is creating sensitivity maps for onshore and offshore wind energy.

## 4. Maritime spatial planning

**Maritime spatial planning is a process of sustainable management of the seas.** It begins with identifying the various types of sea activities, such as fishing, tourism, and resource extraction. Next, potential conflicts between these sectors and their impact on ecosystems are analysed. The following step involves establishing planning frameworks that enable the harmonious operation of different branches of the maritime economy while protecting sensitive natural areas. In the context of offshore wind development, it is often the first point of contention where the opinions and interests of various stakeholders come into play. A thorough and often lengthy public consultation process allows for the identification and early management of potential conflicts.

**In Poland, the *Maritime Spatial Plan for Polish Sea Areas* came into force in 2021.** Work on it started in 2016, so 3-4 years after the location concessions for the OWF in Phase I were issued. Several national and international debates and meetings were organised as part of the three-year public consultation process. A total of 2053 comments were received from 232 applicants. As time went on, more and more applications were submitted for renewable energy generation - a testament to the growing importance of the Baltic Sea for the wind industry, which experienced a halt to onshore turbine development in 2016 due to the *10H rule*. As a result, 'E' - marked areas have been designated where offshore wind turbines can be constructed. These occupy around 10% of the exclusive economic zone.

**With the increasing ambition and technological development of OWE, the need to update the plan is being raised in the media space.** Arguments for this are provided by the Polish Wind Energy Association's 2022 report (Pogorzelski et al., 2022), which identifies 20 potential areas in the Polish part of the Baltic Sea that could participate in the so-called Phase III of OWE development. According to the authors' team, there is a potential for 33 GW of installed capacity. The Instrat's 2021 analysis (Czyżak, Sikorski et al, 2021) states that installed capacity in the Polish exclusive economic zone could reach 31.2 GW. Although such capacity volumes sound abstract at present, their full utilisation may be necessary in the context of a significant increase in electricity demand as we approach climate neutrality by 2050.

## 5. Supporting infrastructure development

**Implementation of the offshore wind programme requires investments in logistics, production chains and facilities.** This includes the development of large-scale and capital-intensive infrastructure necessary to assemble, install, maintain and service wind farms - ports, service bases, shipyards and factories. In addition, to effectively integrate large amounts of wind power into the national electricity system, upgrading the onshore electricity grid and expanding offshore power output facilities is necessary. Connections need to be established to enable the transmission of energy inland, ensuring the stability and reliability of energy exports. Prior to the operation of offshore wind farms, it is essential to complete investments in the grid and secure the capacity of logistics and production facilities. This will enable the timely implementation of projects, which is extremely important for replacing successively decommissioned conventional power plants.

**Two installation terminals will be built in Poland.** These are specialised ports where wind farm components are prepared, assembled and shipped offshore. They are equipped with the necessary infrastructure to handle large and heavy components such as blades, nacelles, towers and wind turbine foundations. The first, owned by Orlen, is being built in Swinoujście and is expected to be completed in 2025. The second will be built by 2026 in Gdansk on the T5 site of the Baltic Hub complex. Funding for its construction will come from the National Recovery and Resilience Plan fund.

**Operational and service bases will be built on the territory of smaller ports in the Polish seaside - towns such as Łeba, Ustka and Władysławowo.** They will serve as centres for developers to coordinate and implement maintenance activities, ensuring the continuous operation of offshore wind farms. They include spare parts warehouses, repair workshops, personnel offices, and docking and refuelling services for service vessels. The ports of Łeba and Ustka also have NRRP funding reserved - adapting them to support offshore wind farms requires some modernisation, including dredging the fairways or renovating the breakwaters. Following a revision of the fund's disbursement plan, the port of Darłowo, which has the potential to support Phase II projects, is also among the beneficiaries.

**European suppliers of critical components are locating their production facilities in northern Poland.** Vestas is building a nacelle assembly plant in Szczecin - for this purpose, it has acquired the steel foundation factory of ST3 Offshore, once one of the largest suppliers of these structures in Europe. Vestas' second industrial investment, located in Szczecin's Skolwin, will manufacture blades for its latest turbine model V236 - 15.0 MW. Also, in the capital of the West Pomeranian Voivodeship, the Spanish company Windar Renovables is planning its wind turbine component factory. In turn, another Spanish company, GRI Renewables Industries, is cooperating with the Industrial Development Agency and the Polish company Baltic Towers on the construction of a modern offshore tower production facility in Gdansk. The numerous investments prove that suppliers of key components recognise the promising offshore wind energy market in Poland. The cross-party consensus, the regulatory framework and the strategic importance of the offshore sector for the country create favourable conditions for opening new investments.

**Exporting 18 GW of new power from the Baltic Sea will require extensive investment in the electricity grid.** This includes the construction of new offshore energy export facilities, such as submarine cables or transformer stations, and the development of new lines and substations on land. The offshore and coastal part is the responsibility of the OWE developers, while the onshore part is the transmission system operator's (Polskie Sieci Elektroenergetyczne, PSE) responsibility. To meet the challenge of overcapacity in the power system, the construction of a North-South HVDC interconnection (although the transmission technology is not yet decided) has been proposed, connecting northern Poland with Upper Silesia, where the largest energy consumers are located. In addition, the construction or modernisation of several new substations in the coastal regions is planned, with the need to connect the nuclear power station under development in the municipality of Choczewo also in mind. The operator has laid out all the necessary investments in a new 'Development Plan for Meeting Current and Future Electricity Demand 2025 - 2034' (PSE, 2024).

**Offshore wind farms will be connected to four substations.** The largest of these will be the Choczewo substation, with the capacity to serve 6.3 GW of power. The investment is expected to be ready by the end of 2025 to allow electricity to be derived from the first farm - Baltic Power - scheduled to be commissioned in early 2026. Another station to

which Polenergia's and Equinor's MFW Bałtyk II i III investments will be connected will be SE Słupsk Wierzbęcino. A third connection point, the Krzemienica substation, will be built in the vicinity of the Żarnowiec substation in order to serve the MFW Bałtyk I and RWE's FEW Baltic II project. In connection with the planned investments in the Oder Bank as part of Phase II, the new development plan for the PSE transmission network also mentions the construction of a new 400 kV substation in Western Pomerania between Koszalin and Szczecin.

**The previous government's idea was to establish Special Energy Zones in northern Poland.**

However, so far it is unclear whether the concept will be continued. Historically, the energy producers and largest consumers were located in the south of the country. This state of affairs is now changing, as newly emerging zero-emission energy sources will use wind and sea - the natural resources of the northern provinces. With a view to the geographical reorientation of energy generation and transmission in the coming years, the previous Government Plenipotentiary for Strategic Energy Infrastructure, in cooperation with PSE and Gaz-System, proposed Special Energy Zones in the vicinity of the main arteries of the electricity and gas network in northern Poland. The areas created are intended to encourage large energy-intensive consumers (more than 100 GWh of electricity consumption per year) with lower energy prices to locate new industrial plants within them. Such a solution could facilitate the operation of the power system in an area of energy overproduction and reduce the need to extend additional transmission lines.

**There are no plans to build hybrid projects or new offshore cross-border connections.**

In January 2024, ENTSO-E published the Offshore Network Development Plans, which are proposals for creating a common European market by providing offshore transmission infrastructure. PSE also contributed to the concept. However, the ONDP BEMiP (ENTSO-E, 2024) proposal for the Baltic Sea states does not include any cross-border maritime connections with Poland in the 2050 perspective. It is noteworthy that a target of 11 GW of installed capacity in 2040 has been taken into account, although the ambition has since been increased to 18 GW with potential for possible further growth. Nevertheless, the concept of a connection to the Danish-German Bornholm Energy Island (to be completed in 2030) is worth discussing for possible international cooperation on transmission in the Baltic. The establishment of such a connection was included in the PSE's Plan for 2021-2030, but no decisive action has been seen so far. Cross-border exchanges with Sweden should also be taken into account. The SwePol Link, commissioned in 2000, will need to be upgraded or replaced in the future, and this opens up opportunities for the integration of new generation capacity, including offshore wind farms both in Poland and in other Baltic countries.

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